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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/652,449	08/29/2003	Minas H. Tanielian	BO1 - 0257US	2457
60483	7590	04/02/2007		
LEE & HAYES, PLLC 421 W. RIVERSIDE AVE. SUITE 500 SPOKANE, WA 99201			EXAMINER TAMAI, KARL I	
			ART UNIT	PAPER NUMBER
			2834	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/02/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/652,449

Applicant(s)

TANIELIAN, MINAS H.

Examiner

Tamai I.E. Karl

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
- 4a) Of the above claim(s) 29-50 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>11/04; 10/03</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of Group I, Claims 1-28 in the reply filed on 1/16/2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### ***Specification***

2. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### ***Drawings***

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the second metal electrode attached to the first surface and mated with the metal electrode on the first surface must be shown or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

5. Claims 14-28 are objected to because of the following informalities: the second metal electrode attached to the first surface and mated with the metal electrode on the first surface is unclear. The "the second metal electrode of the second wafer portion" does not have antecedent basis. Appropriate correction is required.

For the purpose of advancing prosecution on the merits, the examiner will assume the second metal electrode is attached to the second surface of the second wafer and mating with the first electrode of the first wafer.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 7, 8, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Huffman (US 3169200). Huffman teaches a thermo tunnel having first and second electrodes separated by a gap of (1 angstrom/1nm)(col. 5, line 2). In regards to the method of making limitations in claims 7, 8, and 13, the method of making are not germane to the patentability of the apparatus.

8. Claims 1, 7, 8, and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Tavkhelidze et al. (Tavkhelidze) (US 6720704). Tavkhelidze teaches a thermo tunnel having first and second electrodes separated by a gap of (10 angstrom/1nm) (claims 22). In regards to the method of making the gap limitations in claims 7, 8, and 13 are not germane to the patentability of the apparatus.

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***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 2-4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tavkhelidze et al. (Tavkhelidze) (US 6720704) in further view of Martinovsky et al. (Martinovsky)(US 6876123). Tavkhelidze teaches every aspect of the invention except the electrode material being a base metal (Au, Pt, Pd, Ag, Si, W, or Cr) with an alkali metal (Cs or CsO) deposited on the surface. Martinovsky teaches the electrodes with gold or platinum combined with cesium forming an intermetallic compound having a low work function for thermo tunnels. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the thermotunnel of Tavkhelidze with electrodes having cesium on the surface of gold because Martinovsky teaches it provides an efficient generator with low work function electrodes.

11. Claims 5, 6, 9, 14, 18-24, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tavkhelidze et al. (Tavkhelidze) (US 6720704) in further view of Caldwell (US 3515908). Tavkhelidze suggest the use of MEMS techniques and glass or silicon or silica (silicon dioxide) substrates for the generator and electrodes. Tavkhelidze teaches every aspect of the invention except electrodes formed on wafers or substrates that are bonded together and a plurality of tunneling units with removed

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substrate material. Caldwell teaches the electrodes in a thermo electric device on two substrates bonded together (3, 13) with recesses 31 in the removed between two generating electrodes which are connected in series. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the thermotunnel of Tavkhelidze with electrodes formed on bonded substrates as in Caldwell to utilize MEMS assembly techniques as suggested by Tavkhelidze.

In regards to the method of making the gap limitations in claims 18, 19, and 28 are not germane to the patentability of the apparatus. The examiner notes that the recesses or wells 21 between the thermoelectric units in Caldwell are not taught as being etched but the limitation is a method of making limitation, which is not germane to the patentability of the apparatus, and Tavkhelidze suggests etching because it suggests MEMS manufacturing techniques.

12. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tavkhelidze et al. (Tavkhelidze) (US 6720704) in further view of Yater (US 4004210). Tavkhelidze teaches every aspect of the invention except metal plating next to the electrodes and a conductive material adjacent the plating. Yater teaches metal plating 33 to minimize heat loss from the generator and metal plates 10 next to the metal plates forming another generator. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the thermotunnel of Tavkhelidze with metal plates to minimize heat loss and with an adjacent metal material of another generator to increase the electrical output through multiple generators, as taught by Yater.

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13. Claims 15-17 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tavkhelidze et al. (Tavkhelidze) (US 6720704) and Caldwell (US 3515908), in further view of Martinovsky et al. (Martinovsky)(US 6876123). Tavkhelidze and Caldwell teach every aspect of the invention except the electrode material being a base metal (Au, Pt, Pd, Ag, Si, W, or Cr) with an alkali metal (Cs or CsO) deposited on the surface. Martinovsky teaches the electrodes with gold or platinum combined with cesium form an intermetallic compound having a low work function for thermo tunnels. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the thermotunnel of Tavkhelidze and Caldwell with electrodes having cesium on the surface of gold because Martinovsky teaches it provides an efficient generator with low work function electrodes.

14. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tavkhelidze et al. (Tavkhelidze) (US 6720704) and Caldwell (US 3515908), in further view of Yater (US 4004210). Tavkhelidze and Caldwell teach every aspect of the invention except metal plating next to the electrodes and a conductive material adjacent the plating. Yater teaches metal plating 33 to minimize heat loss from the generator and metal plates 10 next to the metal plates forming another generator. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the thermotunnel of Tavkhelidze and Caldwell with metal plates to minimize heat loss and with an adjacent metal material of another generator to increase the electrical output through multiple generators, as taught by Yater.




15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karl I.E. Tamai whose telephone number is (571) 272 - 2036.

The examiner can be normally contacted on Monday through Friday from 8:00 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Darren Schuberg, can be reached at (571) 272 - 2044. The facsimile number for the Group is (571) 273 - 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Karl I Tamai  
PRIMARY PATENT EXAMINER  
March 24, 2007



KARL TAMAI  
PRIMARY EXAMINER